CLAIMS:

1. A method of coupling a first optical transmission means embedded within a composite to a second optical transmission means external to the composite, the method comprising:

locating the position of the first optical means embedded within the composite;

forming a passageway within the composite to the first optical transmission means; and

establishing an optical connection between the first and second optical transmission means at the intersection of the passageway and the first optical transmission means.

2. A method according to Claim 1, further comprising providing a high-quality optical interface surface at the intersection of the passageway and the first optical transmission means.

3. A method according to Claim 1 or 2, wherein the step of forming a passageway comprises drilling or machining through the composite from an exterior surface thereof to the first optical transmission means and severing the first optical transmission means.

4. A method according to Claim 3 as dependent on Claim 2, wherein the step of providing an optical interface surface comprises polishing a severed portion of the first optical transmission means.

5. A method according to any preceding claim, wherein the step of forming a passageway comprises: drilling or machining through the composite to the first optical transmission means; providing the passageway with a protective plug for closing the passageway; and removing the protective plug prior to the step of forming an optical connection.

6. A method according to Claim 1 or 2, wherein the step of forming a passageway comprises irradiating an exterior surface of the composite using a laser to access the first optical transmission means.

7. A method according to Claim 6, wherein the laser irradiation step comprises using an excimer laser.

8. A method according to Claim 6 or 7, further comprising preventing light used in the laser irradiation step from being optically coupled with the first optical transmission means.

9. A method according to Claim 8, wherein the preventing step comprises differentiating between the wavelengths of the light used in the laser machining step and the light used in the first optical transmission means, and preventing transmission of light used in the laser machining step to the first optical transmission means.

10. A method according to Claim 8 or 9, wherein the preventing step comprises allowing the light used in the laser machining step to be transmitted to at least one light beam absorbing means provided within the composite.

11. A method according to any preceding claim, wherein the step of locating the position of the first optical transmission means comprises using an embedded detectable position marker to indicate the location of the first optical transmission means within the composite.

12. A method according to any preceding claim, wherein the step of forming a passageway comprises using a depth marker to indicate when the passageway has been formed to the correct depth.

13. A method according to Claim 12 as dependent from Claim 11, wherein the depth marker comprises the position marker.

14. A method according to any of Claims 11 to 13 as dependent from any of Claims 6 to 10, wherein the position marker or the depth marker comprises a sacrificial coating and the laser irradiation step further comprises removing the coating after formation of the passageway to access the first optical transmission means.

15. A method according to any of Claims 11 to 14, wherein the step of locating the position of the first optical transmission means or the step of forming a passageway comprises locating the position of the position marker or the depth marker within the composite using an imaging technique.

16. A method according to Claim 15, wherein the imaging technique comprises an X-ray imaging process.

17. A method according to Claim 2 or any of Claims 3 to 16 as dependent from Claim 2, wherein the step of establishing an optical connection comprises providing a thermal expanded core optical fibre at the optical interface surface.

18. A method according to any preceding claim, further comprising aligning an interface means within the passageway to be in optical communication with first optical transmission means at the interface surface, and arranging for the interface means to be accessible to the second optical transmission means.

19. A method according to Claim 18, wherein the aligning step comprises using an alignment structure embedded within the composite to align the interface means with the first optical transmission means.

20. A method according to Claim 19, further comprising forming the alignment structure embedded within the composite using an X-ray lithographic technique.

21. A method according to any preceding claim, further comprising optically processing light to or from the first optical transmission means by an optical processing means embedded within the composite and optically connected to the first optical transmission means.

22. A method according to Claim 21, wherein the step of optically processing light comprises steering a light beam.

23. A method according to Claim 22, wherein the steering step comprises using a beam splitter or a micro-turning mirror.

24. A method according to any of Claims 21 to 23, wherein the step of optically processing light comprises collimating a light beam.

25. A method according to Claim 24, wherein the light beam collimating step comprises using a graded index lens or a graded index fibre.

26. A method according to any of Claims 21 to 25, further comprising providing the optical processing means on a micro-substrate and securing the first optical transmission means to the optical processing means using the micro-substrate.

27. A method according to Claim 26 as dependent on Claim 19 or 20, further comprising providing the alignment structure on the micro-substrate.

28. A method according to any preceding claim, wherein the first optical transmission means comprises an elongate structure and the step of establishing an optical connection is effected to a side of the elongate structure.

29. A method according to Claim 28, wherein the step of providing an optical interface surface comprises providing a first evanescent coupling means optically connected to the first optical transmission means.

30. A method according to Claim 29, wherein the step of establishing an optical connection comprises providing a second evanescent coupling means optically connected to the second optical transmission means and aligning the second evanescent coupling means with the first evanescent coupling means.

31. A method according to Claim 28, wherein the first optical transmission means and the second optical transmission means each comprise a D-fibre and the step of establishing an optical connection comprises aligning flat faces of the D-fibres together.

32. A method according to Claim 31, further comprising providing the D-fibres with support structures at the optical interface.

33. An optical coupling for connecting a first optical transmission means embedded within a composite to a second optical transmission means external to the composite, the coupling comprising:

means for locating the position of the first optical transmission means embedded within the composite;

a passageway formed within the composite to the embedded first optical transmission means; and

an optical connection established between the first and second optical transmission means at the intersection of the passageway and the first optical transmission means.

34. An optical coupling according to Claim 33, further comprising a high-quality optical interface surface provided at the intersection of the passageway and the first optical transmission means.

35. An optical coupling according to Claim 33 or 34, wherein the passageway comprises a drilled or machined orifice through the composite from an exterior surface thereof to the first optical transmission means to a depth sufficient to sever the first optical transmission means.

36. An optical coupling according to Claim 35 and dependant on Claim 34, wherein the optical interface surface comprises a polished severed portion of the first optical transmission means.

37. An optical coupling according to any of Claims 33 to 36, wherein the passageway comprises a drilled or machined orifice through the composite to the first optical transmission means; and a protective plug provided in the passageway for closing the passageway, the protective plug being removable prior to forming an optical connection.

38. An optical coupling according to Claim 33 or 34, wherein the passageway comprises a laser irradiated orifice through the composite to the first optical transmission means.

39. An optical coupling according to Claim 38, further comprising means for preventing light used in the formation of the laser irradiated orifice from being optically coupled with the first optical transmission means.

40. An optical coupling according to Claim 39, wherein the preventing means is arranged to differentiate between the wavelengths of the light used in the formation of the laser irradiated orifice and the light used in the first optical transmission means, and to block transmission of light used in the formation of the laser irradiated orifice to the first optical transmission means.

41. An optical coupling according to Claim 39 or 40, wherein the preventing means comprises at least one light beam absorbing means embedded at an appropriate position within the composite.

42. An optical coupling according to any of Claims 33 to 41, wherein the locating means comprises an embedded detectable position marker to indicate the position of the first optical transmission means within the composite.

43. An optical coupling according to any of Claims 33 to 42, further comprising a depth marker embedded within the composite to indicate when the passageway has been formed to the correct depth.

44. An optical coupling according to Claims 43 as dependent on Claim 42, wherein the depth marker comprises the position marker.

45. An optical coupling according to any of Claims 42 to 44 as dependent from any of Claims 38 to 41, wherein the position marker or the depth marker comprises a sacrificial coating which is arranged to be removable after the formation of the passageway to access the first optical transmission means.

46. An optical coupling according to Claim 45, wherein the coating comprises a reflective coating.

47. An optical coupling according to Claim 46, wherein the coating comprises a metallic coating.

48. An optical coupling according Claim 34 or any of Claims 35 to 47 as dependant from Claim 34, wherein the optical interface surface is provided at a thermally expanded core optical fibre connected to the first optical transmission means.

49. An optical coupling according to any of Claims 33 to 48, further comprising an interface means alignable within the passageway to be in optical communication with first optical transmission means at the optical interface surface, the interface means being arranged to be accessible to the second optical transmission means.

50. An optical coupling according to Claim 49, further comprising an alignment structure embedded within the composite for aligning the interface means with the first optical transmission means.

51. An optical coupling according to any of Claims 33 to 50, further comprising optical processing means embedded within the composite, the optical processing means being optically connected to the first optical transmission means for processing light to or from the first optical transmission means.

52. An optical coupling according to Claim 51, wherein the optical processing means comprises means for steering a light beam.

53. An optical coupling according to Claim 52, wherein the steering means comprises a beam splitter or a micro-turning mirror.

54. An optical coupling according to any of Claims 51 to 53, wherein the optical processing means comprises means for collimating a light beam.

55. An optical coupling according to Claim 54, wherein the light beam collimating means comprises a graded index lens or a graded index fibre.

56. An optical coupling according to any of Claims 51 to 55, wherein the optical processing means comprises at least one of the group comprising an optical grating element, a wave-guide, a wave plate, a hologram and an optical filter.

57. An optical coupling according to any of Claims 51 to 56, further comprising a micro-substrate on which the optical processing means is provided and secured to the first optical transmission means.

58. An optical coupling according to Claim 57 as dependent on any of Claims 51 to 56 as dependant from Claim 50, wherein the alignment structure is provided on the micro-substrate.

59. An optical coupling according to any of Claims 33 to 58, wherein the first optical transmission means comprises an elongate structure and the optical interface surface is provided at a side of the elongate structure.

60. An optical coupling according to Claim 59, wherein the optical connection comprises a first evanescent coupling means optically connected to the first optical transmission means.

61. An optical coupling according to Claim 60, wherein the optical connection comprises a second evanescent coupling means optically connected to the second optical transmission means and optically aligned with the first evanescent coupling means.

62. An optical coupling according to Claim 59, wherein the first optical transmission means and the second optical transmission means each comprise a D-fibre which are coupled together by aligning flat faces of the D-fibres together.

63. An optical coupling according to Claim 62, further comprising support structures for the D-fibres at the optical interface.

64. An optical coupling according to any of Claims 33 to 63, wherein the first and/or second optical transmission means comprises an optical fibre.

65. A method or optical coupling substantially as described hereinbefore with reference to the accompanying drawings.